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(54) System for controlling a video display system of a motor vehicle

(57) The intensity of ambient light outside a motor vehicle is detected by an automatic iris system 1a, of a television camera 1 and produces output signals having different levels dependent on the detected intensity. Adjusting circuits 5,6 are provided for adjusting the video signal to different image conditions so as to display clear images on a video monitor 2 at various intensities of the outside light. A suitable one of the adjustment circuits is selected 10, 11 in response to the light signals, thereby displaying a clear image on the display. The video monitor may provide the rearward view of the vehicle instead of a rearview mirror, the camera providing an outside view from the vehicle. Stored video signals may be selected 4 for display e.g. road map data and graphics from an image output device 3.

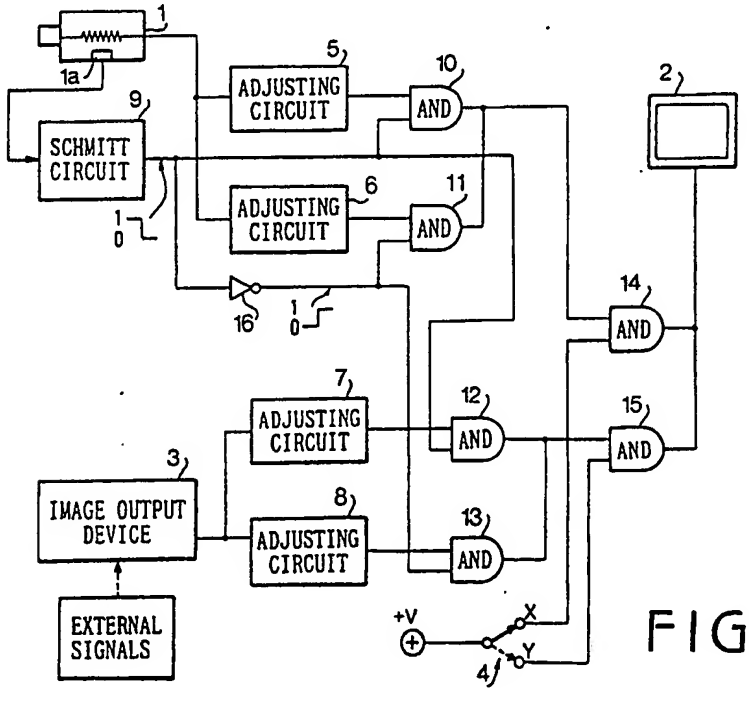

FIG. 1

GB 2 233 530A

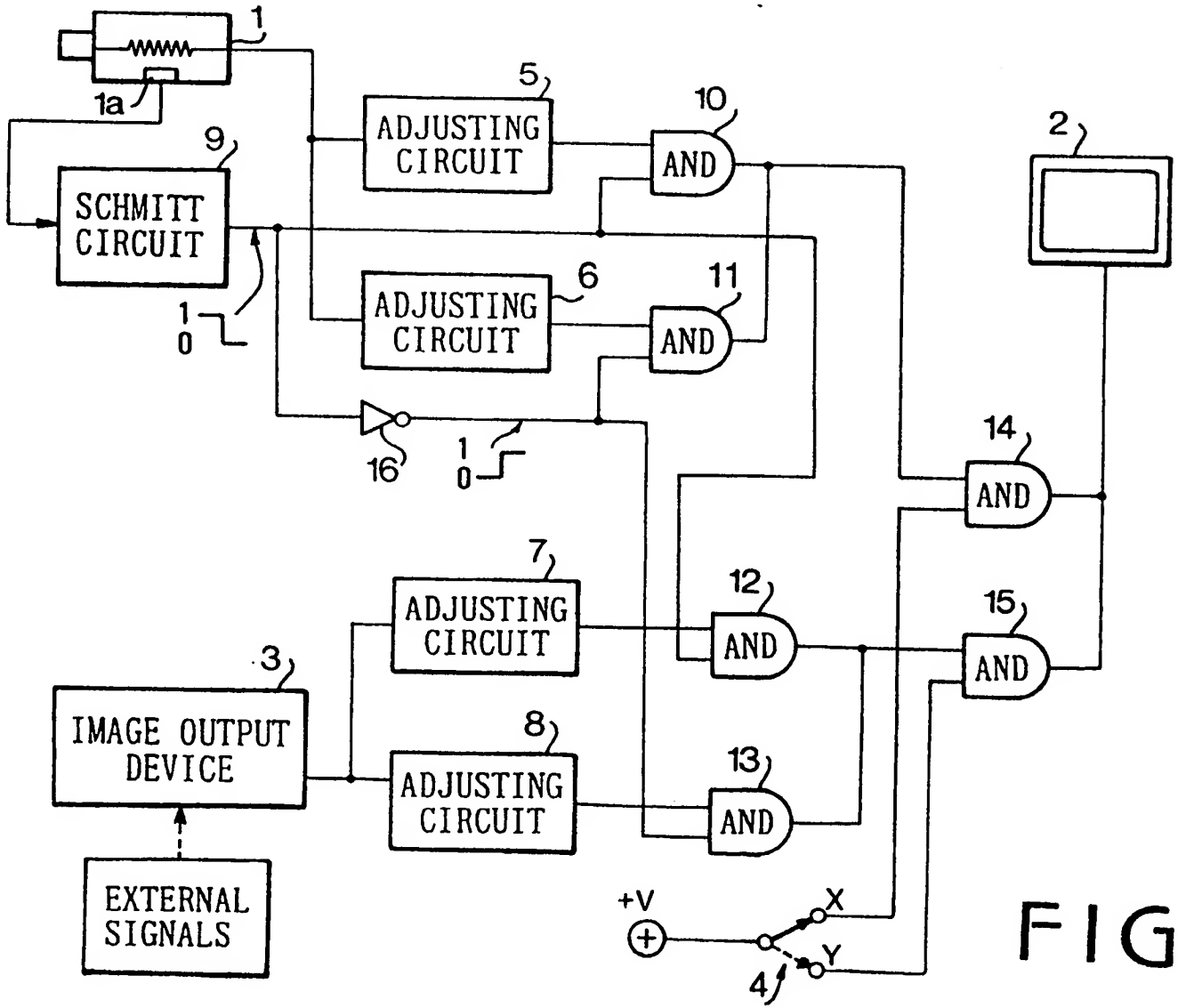
1
1a
9
SCHMITT CIRCUIT
1
0
5
ADJUSTING CIRCUIT
6
ADJUSTING CIRCUIT
16
1
0
10
AND
11
AND
2
14
AND
7
ADJUSTING CIRCUIT
12
AND
15
AND
3
IMAGE OUTPUT DEVICE
8
ADJUSTING CIRCUIT
13
AND
EXTERNAL SIGNALS
+V
X
Y
4

FIG. 1

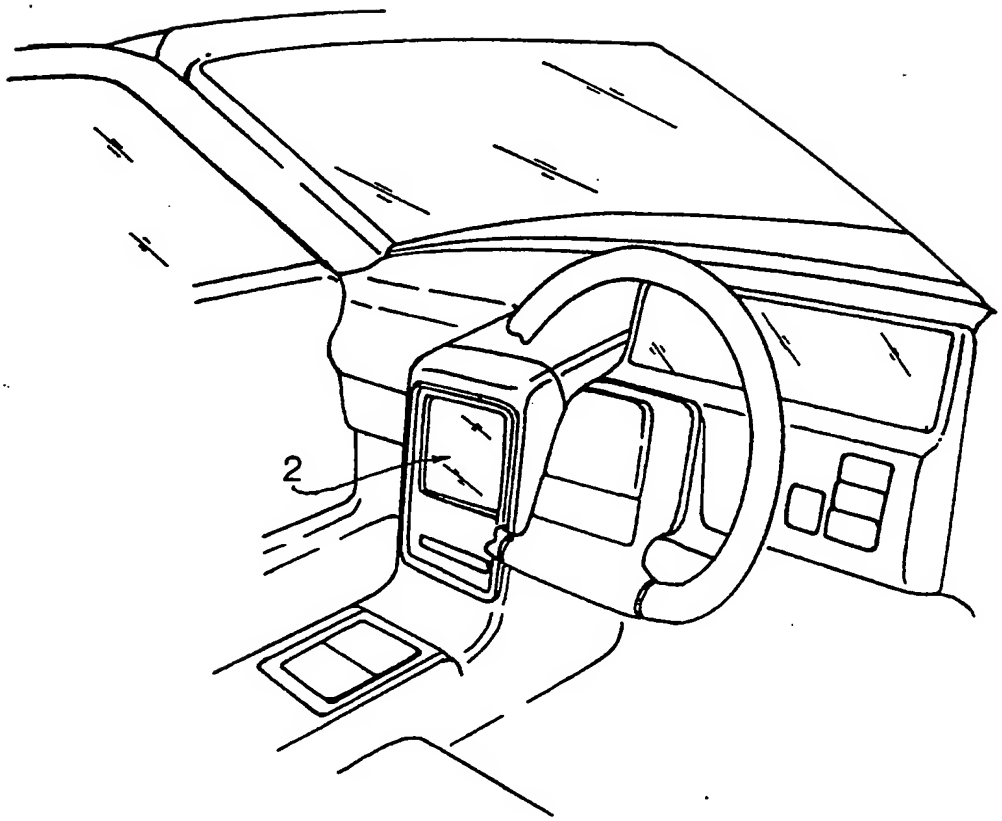

FIG. 2

VIDEO DISPLAY CONTROL SYSTEM FOR A MOTOR VEHICLE

The present invention relates to a television monitor system with a display provided in a motor vehicle, and more particularly to a system for controlling the display of the monitor system. A CRT (Cathode-Ray-Tube) display may be provided in a motor vehicle for receiving television broadcasting, reproducing videotapes and displaying a road map and traffic information around the area where the vehicle is operating using computer graphics and an image output device. Further, if a television camera is installed on the vehicle for monitoring the rearward view from the vehicle, this view may be displayed onthe display as a substitute for a rearview mirror.

Japanese Utility Model Application Laid-open 59-91081 and Japanese Patent Application Laid-open 62-241747 disclose monitor display systems provided in a motor vehicle. In order to ensure safe driving of the vehicle, these systems are provided with inhibiter means which prevents the television system from operating when driving the vehicle.

However, it is necessary to display map information and the rearward view from the vehicle while driving, and it is desirable to provide a clear picture on the display.

Visibility of the picture on the display depends on intensity of the outside light which changes in accordance the time of day and geographical location. Consequently, whenever the intensity of the outside light changes the driver must adjust the picture image on the display to control the luminance, contrast, and colour, by operating respective adjusting knobs provided on the display, which is troublesome for the driver.

The present invention seeks to provide a system for controlling a monitor display system of a motor vehicle in which a picture on a display is automatically and properly controlled in accordance with intensity of outside light of the vehicle.

According to the present invention, there is provided a system for controlling a video display system of a motor vehicle including a television camera producing a video signal and a monitor for displaying corresponding images, the system comprising:

sensing means for sensing ambient light levels outside the vehicle and for producing corresponding output signals;

adjustment circuits for adjusting the video signal to different image conditions so as to control the displayed image; and

means responsive to the output signals of the sensing means for controlling the adjustment circuits so as to optimise the image.

In one embodiment of the present invention, the sensing means includes an automatic iris system provided in the television camera.

The system further comprises an image output device for providing vehicle operating information to be displayed, the selection means being arranged to allow selection of an output signal of the image output device.

Some embodiments of the monitor will now be described by way of example with reference to the accompanying drawings, in which:

Fig.1 is a block diagram showing a monitor display system according to the present invention; and

Fig.2 is a perspective view of a display in the system.

Referring to Figs. 1 and 2, a television set 2 for a monitor system according to the present invention is mounted in an instrument panel of a motor vehicle.

The monitoring system has a television camera 1 with an automatic iris and is arranged to provide an outside view from the vehicle. An image output device 3 is supplied with a data signal from a road map which is previously stored in a memory

of a computer and with a location data signal obtained by a gyrocompass, and produces an image signal of the road map and an actual location of the vehicle composed by computer graphics. A select switch 4 has a pair of fixed contacts X and Y for manually selecting a video output of the television camera 1 and an image output of the image output device 3.

Further, the system has four adjusting circuits 5, 6, 7 and 8 which are set to different levels in contrast, luminance, and tone of the color of the picture on the display of the television set 2. A Schmitt circuit 9 is provided to receive an output signal of the automatic iris 1a for producing an output pulse signal having a high level when the outside light is intense. AND gates 10, 11, 12, 13, 14 and 15, and a NOT gate 16 are provided for selecting one of adjusting circuits 5, 6, 7, 8.

The television camera 1 produces a video signal which is applied to the adjusting circuits 5 and 6. The output signal of the automatic iris 1a of the television camera 1 is applied to the Schmitt circuit 9. If a signal from the automatic iris 1a has higher voltage than a threshold value, where the intensity of the outside light is high, the signal is applied to the Schmitt circuit 9. And the circuit 9 produces a high level signal. If the output signal of the automatic iris 1a represents a low intensity of the outside

light, the Schmitt circuit 9 produces a signal having a low level.

The high level signal from the Schmitt circuit 9 is applied to the inputs of the AND gates 10 and 12, and to the input of the NOT gate 16.

The image signal from the image output device 3 is applied to the adjusting circuit 7 and 8, respectively.

Each of adjusting circuits 5 and 7 is set so as to provide the clearest image on the display under the conditions that the intensity of the outside light of the motor vehicle is high. Thus, the contrast, luminance and tone of the color of the picture is properly controlled under the intense outside light. On the other hand, each of the adjusting circuits 6 and 8 is arranged so as to provide the clearest image under the conditions that the outside of the vehicle is dark. Thus, the contrast, luminance and tone of the color of the picture in the dark outside state is properly controlled.

A signal from the adjusting circuit 5 is applied to the AND gate 10 and a signal from the adjusting circuit 6 is applied to the AND gate 11. Output terminals of the AND gates 10 and 11 are connected to the AND gate 14.

A signal from the adjusting circuit 7 is applied to the AND gate 12 and a signal from the adjusting circuit 8 is applied to the AND gate 13. Output sides of the AND gates 12 and 13 are connected to the AND gate 15. Output terminals of the AND gates 14 and 15 are connected to

the television set 2. The contact X of the select switch 4 is connected to the AND gate 14 and the contact Y is connected to the AND gate 15.

The operation of the monitor system is as follows. When the select switch 4 selects the contact X for the video output of the television camera 1, a video signal is applied to the adjusting circuits 5 and 6, respectively. If the outside of the vehicle is light, the output signal of the Schmitt circuit 9 is applied to the AND gate 10 and the output signal of the adjusting circuit 5 is applied to the AND gate 10. Thus, the AND gate 10 opens to produce a signal which is applied to the AND gate 14. Since the AND gate 14 is applied with a signal from the contact X, the AND gate 14 opens to produce a signal which is applied to the television set 2. The television set 2 operates to display the outside view taken by the television camera 1.

If the outside of the vehicle is dark, the Schmitt circuit 9 produces a low level signal in accordance with the signal from the automatic iris 1a, so that the AND gate 10 closes. On the other hand the NOT gate 16 produces an output signal because of the low level signal from the Schmitt circuit 9, which is applied to the AND gate 11. Since the video signal from the television camera 1 is applied to the AND gate 11 through the adjusting circuit 6, the AND gate 11 opens to produce a signal which opens the AND gate 14.

Thus, the video signal is fed to the television set 2 via the AND gate 14.

When the contact Y of the select switch 4 is selected for the image output of the image output device 3, the image signal is applied to the adjusting circuits 7 and 8, respectively. If it is light outside the vehicle, the signal from the Schmitt circuit 9 is applied to the AND gate12 to which the image signal from the image output device 3 is also applied passing through the adjusting circuit 7.

Thus, the AND gate 12 opens to produce a signal which is applied to the AND gate 15. Since the signal from the contact Y is applied to the AND gate 15, the AND gate 15 opens to produce the image signal which is applied to the television set 2. The television set 2 then displays an image such as the road map and the traffic information composed by computer graphics.

If it is dark outside the vehicle, the output signal from the NOT gate 16 is applied to the AND gate 13. The image signal from the image output device 3 is also applied to the AND gate 13 passing through the adjusting circuit 8. Thus, the AND gate 13 opens to produce a signal which is applied to the television set 2 via the AND gate 15.

When a television broadcast is received, the pictorial image on the television set is also automatically controlled in accordance with the intensity of the outside

light in a similar manner as aforementioned. That is to say, an antenna, a tuner and a photoelectric sensor for detecting the intensity of the outside light are provided on the vehicle for receiving the television broadcast. Two control circuits are provided for controlling the image of the television set 2 dependent on the light level outside of the vehicle. The output of the photoelectric sensor is applied to the Schmitt circuit 9. One of the control circuits is operated in accordance with a signal from the Schmitt circuit 9 or the NOT gate 16.

The display of the television set 2 may be a liquid crystal display. The system of the present invention is particularly effective with a liquid crystal display.

In order to use the television set 2 for displaying the rearward view of the vehicle instead of the rearview mirror, the image on the display is changed to a monochrome image. Consequently, it is easy to sense the distance between the vehicle and a following vehicle, thereby improving the safety of driving, which is confirmed by experiments.

In accordance with the principles of the present invention, the image on the display of the television set is automatically controlled in response to the intensity of the light outside the motor vehicle. Consequently, the driver need not manually adjust image conditions of the display, so that the safety driving of the vehicle is ensured.

As described, the television set 2 is installed in console inside the vehicle as shown in Fig. 2, but it may of course be installed wherever the driver can see it.

While the present preferred embodiment of the present invention has been shown and described, it is to be understood that this disclosure is for the purpose of illustration and that various changes and modifications made within the scope of the appended claims.

CLAIMS:

1. A system for controlling a video display system of a motor vehicle including a television camera producing a video signal and a monitor for displaying corresponding images, the system comprising:

sensing means for sensing ambient light levels outside the vehicle and for producing corresponding output signals;

adjustment circuits for adjusting the video signal to different image conditions so as to control the displayed image; and

means responsive to the output signals of the sensing means for controlling the adjustment circuits so as to optimise the image.

2. A system according to Claim 1 wherein, the sensing means includes an automatic iris control system in the television camera.

3. A system according to Claim 1 wherein, the selecting means comprises a Schmitt circuit, gates, and a switch.

4. A system according to Claim 1, further comprising an image output device for providing vehicle operating information to be displayed, the selection means being arranged to allow selection of an output signal of the image output device.

5. A system for controlling a graphic display

system in a vehicle substantially as herein described with reference to the accompanying drawings.

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